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Forcasting the Impact of Surface Mining on Surroundingusing Cloud Computing

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Abstract Mining is an important process by using which we are extracting the most of the valuable product from the core of the earth. It is the process which deals with many steps of extraction. Here we have taken the cases of Danbad and Jharia, which now a day's found in the state of Jharkhand. The mining projects vary according to the type of metals or materials to be extracted from the earth. The majority of proposed mining projects involve the extraction of ore deposits such as copper, nickel, cobalt, gold, silver, lead, zinc, molybdenum, and platinum [2]. The environmental impacts of large-scale mining projects involving these metal ores are the subject of this Guidebook. The Guidebook does not discuss the mining of ores that are extracted using strip mining methods, including aluminum (bauxite), phosphate, and uranium [4]. The Guidebook also does not discuss mining involving extraction of coal or aggregates, such as sand, gravel, and limestone.

Keywords: *extraction, soil impurity, CO2, mining, tailing, environment, water and air pollution, cloud*

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1. Phases of Mining

There are different phases of a mining project, beginning with mineral ore exploration and ending with the post-closure period. What follows are the typical phases of a proposed mining project. Each phase of mining is associated with different sets of environmental impacts.

1.1. Exploration

It is the most fundamental step of mining. Before going to start any work we have to make a study about the zone and its specific environment. As we know, that A mining project can only commence with knowledge of the extent and value of the mineral ore deposit [2]. Information about the location and value of the mineral ore deposit is obtained during the exploration phase. This phase includes surveys, field studies, and drilling test boreholes and other exploratory excavations.

The exploratory phase may involve clearing of wide areas of vegetation (typically in lines), to allow the entry of heavy vehicles mounted with drilling rigs [3].

1.2. Development

If the mineral ore exploration phase proves that there is a large enough mineral ore deposit, of Sufficient grade, then the project proponent may begin to plan for the development of the mine.

This phase of the mining project has several distinct components. It is the phase which deals with the subjective analysis about the ore.

1.2.1. Construction of access roads

The construction of access roads either to provide heavy equipment and supplies to the mine site or to ship out processed metals and ores, can have substantial environmental impacts, especially if access roads cut through ecologically sensitive areas or are near previously isolated community. Hence to perform the above set of process we must have to perform the Environment Impact Assessment (EIA) [5].

Erosion near a mining road, Pelambres mine, Chile
PHOTO: Rocio Avila Fernandez

1.3. Active mining

A active mining is the process which concern with the current process. Once a mining company has constructed access roads and prepared staging areas that would house project personnel and equipment, mining may commence.

All types of active mining share a common aspect:

1. The extraction and concentration (or beneficiation) of a metal from the earth.

2. Proposed mining projects differ considerably in the proposed method for extracting, and
3. Concentrating the metallic ore

1.3.1. Open-pit mining

Open-pit mining is a type of strip mining in which the ore deposit extends very deep in the ground, necessitating the removal of layer upon layer of overburden and ore [1]. In many cases, logging of trees and clear-cutting or burning of vegetation above the ore deposit may precede removal of the overburden.

Open-pit mine in Cerro de Pasco, Peru
PHOTO: Centro de Cultura Popular LABOR, Peru

1.3.2. Placer mining

Placer mining is used when the metal of interest is associated with sediment in a stream bed or floodplain. Bulldozers, dredges, or hydraulic jets of water (a process called 'hydraulic mining') are used to extract the ore. Placer mining is usually aimed at removing gold from stream sediments and floodplains.

1.3.3. Underground mining

It is the most risky mining process, but it leads a great exposure to ore extraction. Here we are used to create the tunnel, and through this tunnel we are entering to the mines. In underground mining, a minimal amount of overburden is removed to gain access to the ore deposit. Access to this ore deposit is gained by tunnels or shafts. But identification of the safe tunnel is also very important [3]. Tunnels or shafts lead to a more horizontal network of underground tunnels that directly access the ore. In an underground mining method called 'stoping' or 'block caving,' sections or blocks of rock are removed in vertical strips that leave a connected underground cavity that is usually filled with cemented aggregate and waste rock[1].

1.3.4. Reworking of inactive or abandoned mines and tailings

As the heading suggest, some mining projects involve the reworking of waste piles (often tailings) from inactive or abandoned mines, or older waste piles at active mines. Typically, this is proposed when more efficient methods of metal beneficiation have made it economical to re-extract metals from old mining waste.

1.4. Disposal of overburden and waste rock

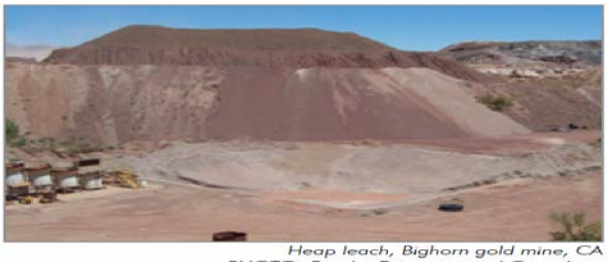
In almost every project, metallic ores are buried under a layer of ordinary soil or rock (called 'overburden' or 'waste rock') that must be moved or excavated to allow access to the metallic ore deposit. For most mining projects, the quantity of overburden generated by mining is enormous. The ratio of the quantity of overburden to the quantity of mineral ore (called the 'strip ratio') is usually greater than one, and can be much higher.

1.5. Ore extraction

After a mining company has removed overburden, extraction of the mineral ore begins using specialized heavy equipment and machinery, such as loaders, haulers, and dump trucks, which transport the ore to processing facilities using haul roads.

1.6. Beneficiation

Although metallic ores contain elevated levels of metals, they generate large quantities of waste. For example, if we take the case of copper extraction, then in the case of a good grade copper ore may be only one quarter of one percent [4]. The gold content of a good grade gold ore may be only a few one-hundredths of a percent. Therefore, the next step in mining is grinding (or milling) the ore and separating the relatively small quantities of metal from the nonmetallic material of the ore in a process called 'beneficiation [4].



Heap leach, Bighorn gold mine, CA
PHOTO: Bender Environmental Consulting

1.7. Tailings disposal

As we know that, in the extraction of ore, many of the toxic metals are often arises. Even high-grade mineral ores consist almost entirely of non-metallic materials and often contain undesired toxic metals (such as cadmium, lead, and arsenic).

But if, the beneficiation process generates high-volume waste called 'tailings,' the residue of an ore that remains after it has been milled and the desired metals have been extracted (e.g., with cyanide (gold) or sulfuric acid (copper)).

1.8. Site reclamation and closure

When active mining ceases, mine facilities and the site are reclaimed and closed. The goal of mine site reclamation and closure should always be to return the site to a condition that most resembles the pre-mining condition [7]. Mines that are notorious for their immense impact on the environment often made impacts only during the closure phase, when active mining operations ceased.

2. Environmental and Social Impacts of Mining

As we know that, through the process of mining we are getting good things as output, but this also causes a lot of impacts on environment as well as on society. During the ore extraction many of the residual things arises which

causes the pollution and indirectly leads some sever diseases.

2.1. Impacts on water resources

Water is a life, without water no one can survive, and it is true. But due to because of mining process it place a great significant impact on water quality and availability of water resources within the project area [5]. The most important fact arises that, whether surface and groundwater supplies will remain fit for human consumption, and whether the quality of surface waters in the project area will remain adequate to support native aquatic life and terrestrial wildlife.

2.1.1. Acid mine drainage and contaminant leaching

The potential for acid mine drainage is a key question. The answer will determine whether a proposed mining project is environmentally acceptable. When mined materials (such as the walls of open pits and underground mines, tailings, waste rock, and heap and dump leach materials) are excavated and exposed to oxygen and water, acid can form if iron sulfide minerals (especially pyrite, or 'fools gold') are abundant and there is an insufficient amount of neutralizing material to counteract the acid formation.

2.1.2. Erosion of soils and mine wastes into surface waters

When ever the mining process continues then it not only pollute the environment, but also it put a great impact on underground water quality [5]. It indirect also effect the soil quality also. So, the potential of soil and sediment eroding into and degrading surface water quality is a serious problem.

Overburden drainage at an Australian mine
PHOTO: Peripitus

According to a study commissioned by the European Union: "Because of the large area of land disturbed by mining operations and the large quantities of earthen materials exposed at sites, erosion can be a major concern at hardrock mining sites. Consequently, erosion control must be considered from the beginning of operations through completion of reclamation [6]. Erosion may cause significant loading of sediments (and any entrained chemical pollutants) to nearby waterbodies, especially during severe storm events and high snow melt periods.

2.1.3. Impacts of tailing impoundments, waste rock, heap leach, and dump leach facilities

This is another important aspect of mining which causes the pollution. The impacts of wet tailings impoundments, waste rock, heap leach, and dump leach facilities on water quality can be severe. These impacts cause the contamination of groundwater beneath these facilities and surface waters. The other toxic substances can leach from these facilities, percolate through the ground, and contaminate groundwater, especially if the bottom of these facilities is not fitted with an impermeable liner.

2.1.4. Impacts of mine dewatering

It is a case of mining process where an open pit intersects the water table, groundwater flows into the open pit. In order to make the operation feasible, mining companies must pump and discharge this water to another location. Pumping and discharging mine water causes a unique set of environmental impacts.

We also know that Mine water is produced when the water table is higher than the underground mining workings or the depth of an open pit surfaces mine. When this occurs, the water must be pumped out of the mine [9]. Alternatively, water may be pumped from wells surrounding the mine to create a cone of depression in the ground water table, thereby reducing infiltration. When the mine is operational, mine water must be continually removed from the mine to facilitate the removal of the ore [8]. However, once mining operations end, the removal and management of mine water often end, resulting in possible accumulation in rock fractures, shafts, tunnels, and open pits and uncontrolled releases to the environment.

2.1.5. Impacts of mining projects on air quality

The mining not only pollute the water but also the air is also get polluted in this process. Airborne emissions occur during each stage of the mine cycle, but especially during

1. Exploration,
2. Development,
3. Construction, and
4. Operational activities.

These above phases are the prime stages of the Mining operations which mobilize large amounts of material, and waste piles containing small size particles are easily dispersed by the wind. The largest sources of air pollution in mining operations are:

- Particulate matter transported by the wind as a result of excavations, blasting, transportation of materials [5], wind erosion
- Gas emissions from the combustion of fuels in stationary and mobile sources, explosions, and mineral processing. Once pollutants enter the atmosphere, they undergo physical and chemical changes before reaching a receptor [7].

2.1.6. Mobile sources

These are also the most important reason for air pollution. Now a days heavy vehicles used in excavation operations, cars that transport personnel at the mining site, and trucks that transport mining materials.

So the use of these vehicles ejects a lot of CO2 gases in to our atmosphere which also causes green house effect. The level of polluting emissions from these sources depends on the fuel and conditions of the equipment [3]. Even though individual emissions can be relatively small, collectively these emissions can be of real concern. In

addition, mobile sources are a major source of particulate matter, carbon monoxide, and volatile organic compounds that contribute significantly to the formation of ground-level ozone.

2.1.7. Stationary sources

The main gaseous emissions are from combustion of fuels in power generation installations, and drying, roasting, and smelting operations. Many producers of precious metals smelt metal on-site, prior to shipping to off-site refineries. Typically, gold and silver is produced in melting/fluxing furnaces that may produce elevated levels of airborne mercury, arsenic, sulfur dioxide, and other metals [2]. The U.S. Environmental Protection Agency defines 'fugitive emissions' as "those emissions which could not reasonably pass through a stack, chimney, vent or other functionally-equivalent which is as showed in the Figure 1 below.

Figure 1.

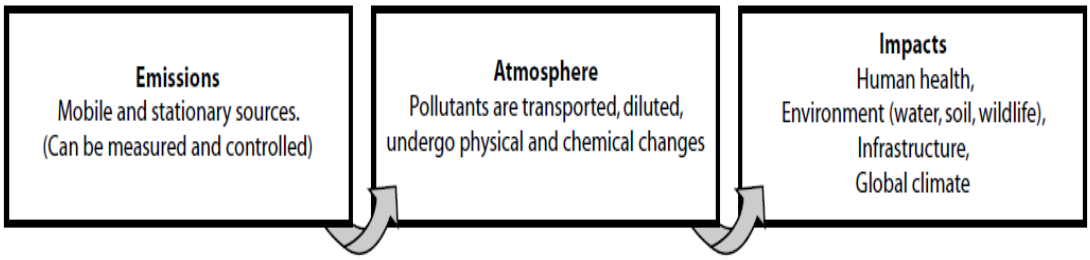


Figure 1

2.1.8. Incidental releases of mercury

Mercury is commonly present in gold ore. Although concentrations vary substantially, even within a specific ore deposit, mercury is found in gold ore and associated waste materials. If the content of mercury in a gold ore is 10 mg/ kg, and one million tons of ore is processed at a particular mine (not unusual concentrations), 10 tons of mercury are potentially released to the environment. This is a major source of mercury and should be controlled [1].

2.1.9. Noise and vibration

Noise pollution associated with mining may include noise from vehicle engines, loading and unloading of rock into steel dumpers, chutes, power generation, and other sources. Cumulative impacts of shoveling, ripping, drilling, blasting, transport, crushing, grinding, and stock-piling can significantly affect wildlife and nearby residents. Vibrations are associated with many types of equipment used in mining operations, but blasting is considered the major source.

2.2.1. Habitat loss

Due to because of air and water pollution, not only humans are effected but also the Wildlife species are also effected up to great extent[3]. As we know that the Survival of these species can depend on

1. soil conditions,
2. local climate,
3. altitude, and
4. other features of the local habitat.

But due to because of Mining , it causes direct and indirect damage to wildlife. And also it is the prime cause due to because of which some wild life species are obsolete now a days and few are going to obsolete very soon if it is not going to control.

2.2.2. Habitat fragmentation

Habitat fragmentation occurs when large areas of land are broken up into smaller and smaller patches, making dispersal by native species from one patch to another difficult or impossible, and cutting off migratory routes. Isolation may lead to local decline of species, or genetic effects such as inbreeding. Species that require large patches of forest simply disappear.

2.3. Impacts of mining projects on soil quality

Another important area is soil. We know that India is an agriculture country. We are going to produce every thing on the basis of agriculture. But due to because of Mining, now a days the agriculture is also effected up to great extent. Due to mining process the soil is also polluted over a large area[8]. Agricultural activities near a mining project may be particularly affected. Day by day due to increase in mining process the climate is also get change and hence the fertilization power of the soil also get decrease in vast rate.

2.4. Impacts of mining projects on social values

The social impacts of large-scale mining projects are controversial and complex. Mineral development can create wealth, but it can also cause considerable disruption. Mining projects may create jobs, roads, schools, and increase the demands of goods and services in remote and impoverished areas, but the benefits and costs may be unevenly shared [8]. If communities feel they are being unfairly treated or inadequately compensated, mining projects can lead to social tension and violent conflict.

2.5.1. Human displacement and resettlement

According to the International Institute for Environment and Development:

"The displacement of settled communities is a significant cause of resentment and conflict associated with large-scale mineral development. Entire communities may be uprooted and forced to shift elsewhere, often into purpose-built settlements not necessarily of their own choosing. Besides losing their homes, communities may

also lose their land, and thus their livelihoods [7]. Community institutions and power relations may also be disrupted. Displaced communities are often settled in areas without adequate resources or are left near the mine, where they may bear the brunt of pollution and contamination. Forced resettlement can be particularly disastrous for indigenous communities who have strong cultural and spiritual ties to the lands of their ancestors and who may find it difficult to survive when these are broken." 9

2.5.2. Impacts of migration

According to the International Institute for Environment and Development: "One of the most significant impacts of mining activity is the migration of people into a mine area, particularly in remote parts of developing countries where the mine represents the single most important economic activity.

2.5.3. Lost access to clean water

According to scientists at the University of Manchester (UK) and the University of Colorado (U.S.): "Impacts on water quality and quantity are among the most contentious aspects of mining projects. Companies insist that the use of modern technologies will ensure environmentally friendly mining practices

2.5.4. Impacts on livelihoods

When mining activities are not adequately managed, the result is degraded soils, water, biodiversity, and forest resources, which are critical to the subsistence of local people. The situation is made worse when mining activities take place in areas inhabited by populations historically marginalized, discriminated against, or excluded. Proponents of mining projects must insure that the basic rights of affected individuals and communities are upheld and not infringed upon..

2.5.5. Impacts on public health

The World Health Organization (WHO) defines health as a "state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity." Because of the quantity, concentration, or physical, chemical or infectious characteristics, hazardous substances may (1) cause or contribute to an increase of mortality or an increase in serious irreversible or incapacitating illness [4]; or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed [4].

Climate change considerations Every EIA for a project that has the potential to change the global carbon budget should include an assessment of a project's carbon impact [7]. Large-scale mining projects have the potential to alter global carbon in at least the following ways: Lost CO2 uptake by forests and vegetation that is cleared. Many large-scale mining projects are proposed in heavily forested areas of tropical regions that are critical for absorbing atmospheric carbon dioxide (CO2) and maintaining a healthy balance between CO2 emissions and CO2 uptake.

3. Conclusion

As we know that the mining is an important process to extract the ore from the core of earth. Without mining we cannot able to get the valuable product for our benefit as well as growth of our nation. Now a day we are fully depends on the mining process. For example if we take the case of LPG gas to get our day to day activity. Or even if the take the transport then also we depends on fuel which a product of mining. Now a day we use the nuclear reactor for the production of electricity, but to do so we depends upon the Uranium isotopes which is an ultimate gift of mining.

No doubt by using this we are enhancing our selves as well as our country, but side by side it increase the pollution also, which is a important factor which we cannot ignore. The pollution is now badly effect the soil, water, Air, etc up to great extent for which now a days we are suffering from many diseases like cancer, asthma, bone marrow etc. now a day's most of the wild species are also get obsolete and we are having very few other species which is going to be obsolete very soon if it is not going to control..Hence we have to go for safe mining which is able to control the pollution.

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